YEAR TWO PROGRESS REPORT

1. Project Title: Use And Usefulness: A Comparative Study Of Seasonal Climate Forecasting Systems In Drought-Affected Regions Of Latin America

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5. Project Activities to Date:

This project compares the use of climate information in policy-making in two semi-arid regions of South America—the state of Ceará, Northeast Brazil, and Region IV (La Serena) in Chile. During the first two years of project activities, the research teams in each country were assembled and specific research plans were prepared and carried out. The following tasks were accomplished.

5. 1. Team meeting:

In January of 2002, the Co-PIs, collaborators, and field team from Brazil, Chile, and Arizona met in Tucson, AZ for a five day workshop. This was the first time that all of the investigators were able to meet after the research was initiated. The workshop was divided into three parts. During the first two days, each country-team presented the research carried out in Year One and their preliminary findings. The following two days were devoted in part to comparing and refining methodologies. In addition, there was significant discussion on points of comparison of the institutional, physical, and social environments, highlighting both similarities and differences to focus further analysis. During the final day, the participants outlined a work plan for the remainder of year two and year three. The work plan outlined areas of continued research, future meetings, as well as a publication schedule. Next, part of team went on a short trip to Sulphur

Springs, Arizona, where field research focusing on climate variability and farming is being carried out in the context of the Southwest Climate Assessment (CLIMAS).

5.2. Vulnerability Mapping:

5.2.1 Brazil

In Year Two, field activities initiated in August 2000 were continued. The previous three years of research in Ceará (1997-2000) succeeded in identifying the vulnerabilities of different farmer groups throughout the state. Since this research revealed that the most vulnerable groups of farmers are those who benefit least from climate information, the research focused on the use of climate information by local policymakers. The research question was defined as: How could a município leader, the *prefeito* (roughly, mayor) use climate forecasts to mitigate the impacts of drought? The research strategy then was to ascertain the kind of information tools that the prefeito would need to do such proactive drought planning. To achieve this strategy, we designed a method of "vulnerability mapping" at the município level to be used as a planning tool. Thus, the research goals of the first two years are to generate the município vulnerability map, present this product to a cross-section of local officials both formal and informal, and facilitate the creation of a drought plan to be mobilized in the event of a predicted drought. In July and August (2001), visits were made to Tauá and Boa Viagem municípios in order to validate and refine the vulnerability maps created based on the first year fieldwork. In both municípios the maps were presented in public forums. Participants included the prefeitos (mayors) and other municipal representatives, as well as church and community leaders, members of the extension service, and interested members of the local communities. The purpose of the forums was to present the maps and generate feedback to determine whether our vulnerability maps based on the sample communities accurately represented vulnerability according to the município residents. Based on the feedback from the participants, changes were made both in the methodology and in map interpretation.

In November of 2001, fieldwork was carried out in Limoeiro do Norte, the third sample município, by team members from the Federal University of Ceará, FUNCEME, and SEPLAN (the Secretariat for Planning). Vulnerability maps were developed based on this work and, as in the other municípios, presented in a public forum. Based both on the participatory methodology and the feedback from the forums, we developed survey questionnaires that are currently being applied in the remainder of the communities in the pilot municípios. The questionnaires were developed as a part of an effort to simplify the mapping procedure in order to institutionalize the process and ease its inclusion in a more massive state-level effort to map the vulnerability to drought of Ceará.

5.2.2 Chile

In Chile, the purpose of the research was to define the vulnerability of different rural stakeholders to climate variability and to document the public role in relation to

climate-based crisis. Research work focused primarily on the vulnerability assessment activity.

Over the last year, the Chile team developed their fieldwork strategy. In May 2001, team members Leon and Bahamondes applied the quantitative and qualitative survey to the proposed field sites. The sample of stakeholders includes small-scale comuneros and individual landholders, as well as a few export-oriented, larger growers. The survey was thus applied to different categories of farmers, according to a) land tenure regime (i.e. communal and private), and b) origin of irrigation water (i.e. from reservoirs on one hand, and rivers, streams, or springs on the other). Furthermore, the research instrument used in Brazil was applied to the Chilean context, since one of the major concerns was to define common research questions across the two countries (and regions) and to adopt similar methodologies that will facilitate cross-country comparisons and insights.

Sampled households from the *Comunidades Agrícolas* include three sites—Carquindaño (*municipio* of Canela), El Tome (municipio of Monte Patria), and El Durazno (municipio of Ovalle). Some households in the Comunidades Agrícolas may have water rights to rivers, but the general rule is that they depend on less secure sources for irrigation such as streams and springs, to which they have historical rights.

Private small-scale properties, depend on a river for irrigation water, were surveyed in the municipio of Río Hurtado. Other small-scale growers in the municipio of Monte Patria, but depend on a reservoir were surveyed in the area known as Guatulame. These households appear as less vulnerable because droughts have never been so intense to dry up these watercourses. Nonetheless, distance to markets in Río Hurtado seems to be a key issue. Data collected through the survey is in its final phase of processing.

5.3 Institutional Analysis of Decisionmaking in Chile and Brazil

Regarding the use of climate information at the state level, the research team applied an in-depth questionnaire to a sample of 20 mid-level técnicos (in Brazil) and 19 (in Chile). Approximately 10 more interviews in Brazil and 15 in Chile are expected to be collected over the Summer of 2002. The main goal of the questionnaire is to go beyond the consolidation of information on user's needs and constraints for data use and build policymaking models which highlight where state-of-the-art climate forecasts information can be incorporated into resource decision-making. Following a methodology developed by Steve Rayner, Denise Lach and Helen Ingram in their comparative study of water management in three U.S. water resource systems, we aim at identifying conditions beyond improved information reliability, accuracy and skill, which would increase or constrain the use of seasonal climate forecasting in the areas of agriculture, water management and disaster relief policymaking in Ceará and Chile. We seek to examine not only data use constraints related to climate information characteristics but also to the policy systems themselves, identifying institutional, political, and cultural limitations and opportunities that shape drought planning in Chile and Brazil. This component of the study aimed at complementing research carried out from 1997-2000 in Ceará and building up a database that could be compared to Chile (the

same questionnaire was applied to policymakers in Chile). At this point, all the data already collected is being entered in NuDist for future analysis.

6. Preliminary Results and Insights from Year Two

In the case of Chile,

- There is no effective, state-funded climate forecasting infrastructure that contributes to public policymaking in Chile. On the other hand, Chile has an active private market that appears as the natural user for forecast information. Despite preliminary indications that some private forecast users have paid during several years for this service provided by one climatologist from the University of Chile, preliminary evidence from our interviews suggest that the information has not been utilized in the decision making process in the public sphere.
- The overall public role in mitigating climatic crisis is limited to crisis management. The public sector usually redirects its funds in order to assist those in need during a drought. In Chile, droughts can be officially declared as such only after two consecutive years of below-normal precipitation. This official recognition triggers the public response, which is usually oriented to providing basic goods and services such as water pumps, hoses, and free transportation for cattle. Public funds can also be utilized for improvements of infrastructure such as irrigation canals. Nonetheless, it appears that the aid is not necessarily oriented to the most vulnerable households within the study area, but to those enjoying higher political clout. There is definitely no proactive drought planning, at neither the governmental nor the community level.
- The nature of vulnerability in Chile mostly involves issues of water management and water rights negotiated among private stakeholders.

In the case of Ceará

- This project has had a major influence on policymaking in the state of Ceará. First, it has demonstrated that the appropriate use of climate forecasting as a "new technology" in the hands of policymakers must be learned over time. It is only now that policymakers in the state are beginning to use climate forecasts as a planning tool. The change in perception away from drought as an abnormal climatic event toward drought as part of the reality of a semi-arid environment has pervaded most levels of state government. Thus, the widely-accepted goal is not to be unprepared for the next drought, but to plan as if drought might occur next year. Then the forecast becomes a trigger in the process, initiating a series of actions designed to mitigate drought impacts.
- Local vulnerability maps are effective tools for planning at the local level. They present an objective and transparent reality with regard to climate variability. It is possible that local governments will set priorities in response to other kinds of realities (i.e., political ones), but they do so in the face of

very public information about where the greatest vulnerabilities lie within the município. It is an immense change to see local authorities talk about vulnerabilities and drought planning.

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Regarding institutional analysis of drought planning at the national and state level, preliminary findings indicate that the use of climate information in decisionmaking is affected both by broader formal institutional arrangements such as legislation, level of decentralization, and access to information as well as informal arrangements such as organizational culture and individuals' commitment. On the one hand, Chile's more centralized policy system seems to less conducive to the kind of flexibility needed to incorporate innovation in decisionmaking, especially in drought planning at the local level. On the other hand, as far as water management is concerned, the higher level of privatization in the system in Chile might make it more willing to adopt innovation that can increase profit margins. In addition, the lack of an institutionalized system of climate forecasting production and communication is a clear impediment to its use in drought planning. In Brazil, recent institutional change, especially in the water sector towards a more participative and open process, has created the opportunity for the incorporation of climate information in water management decisionmaking at the watershed level.

7. Plans for Year Three

In September of 2002, Finan and Nelson will travel to Ceará to present the finalized vulnerability maps based on the participatory and survey research. In each of the three pilot municípios the maps will be used to facilitate the creation of a drought plan to be mobilized in the event of a forecasted drought. The state has indicated an interest to devise a list of potential interventions it is willing to support at the local level. The município drought plans will be coordinated with these interventions. The result will be a município level drought plan, developed in an open, transparent process that is directly backed by the state.

In Year Three, the team also intends to complete analysis of the data collected and initiate writing up of the results both separately and comparatively. Two workshops are scheduled to be held in Brazil (November 2002) and Chile (Spring 2003). The aim of these workshops is both to divulge project results to the public and initiate a dialogue with policymakers on how research results can be best applied to decisonmaking regarding drought-related planning in Chile and Brazil. The workshops will also provide the research team with the opportunity to meet and work together.

Respectfully submitted,

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Co-PIs